

SYSTEM AND METHOD FOR JOINING MULLIONS TO TRANSOMS

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Cited documents:

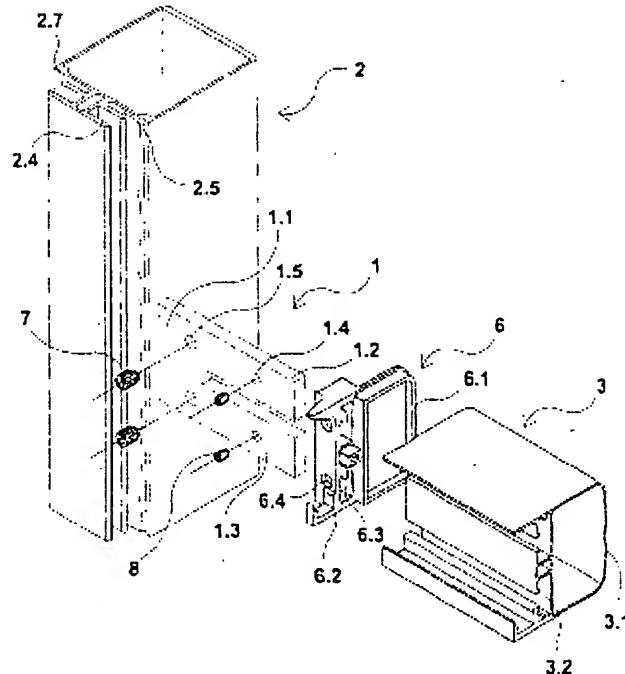
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- US4707959
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Abstract of WO02101166

A system for joining mullions to transoms comprising:- section bars, which are suitable to obtain transoms (3), having a body (3.1) and at least one channel (3.2) whose longer axis is the vertical axis, and whose longitudinal axis is parallel to that of transoms (3) ; - section bars, which are suitable to obtain mullions (2), having at least one seat (2.2), whose longitudinal axis is parallel to that of mullions (2) ; each seat (2.2) is an ideal extension of channels (3.2) of transom (3) and is divided into at least two channels (2.4,



2.5) by at least one mm (2.6), whose longitudinal axis is parallel to that of mullion (2) ; - inserts (1) formed by plates having at least two holes (1.4, 1.5), out of which at least one hole (1.5) is obtained at one end ; the said holes (1.4, 1.5) contain screws or dowels (7, 8) ; each insert (1) is fitted into at least one channel (3.2) of transom (3) and one channel (2.4, 2.5) of mullion(2); - spacers (4, 5) to spare the transoms vertically.

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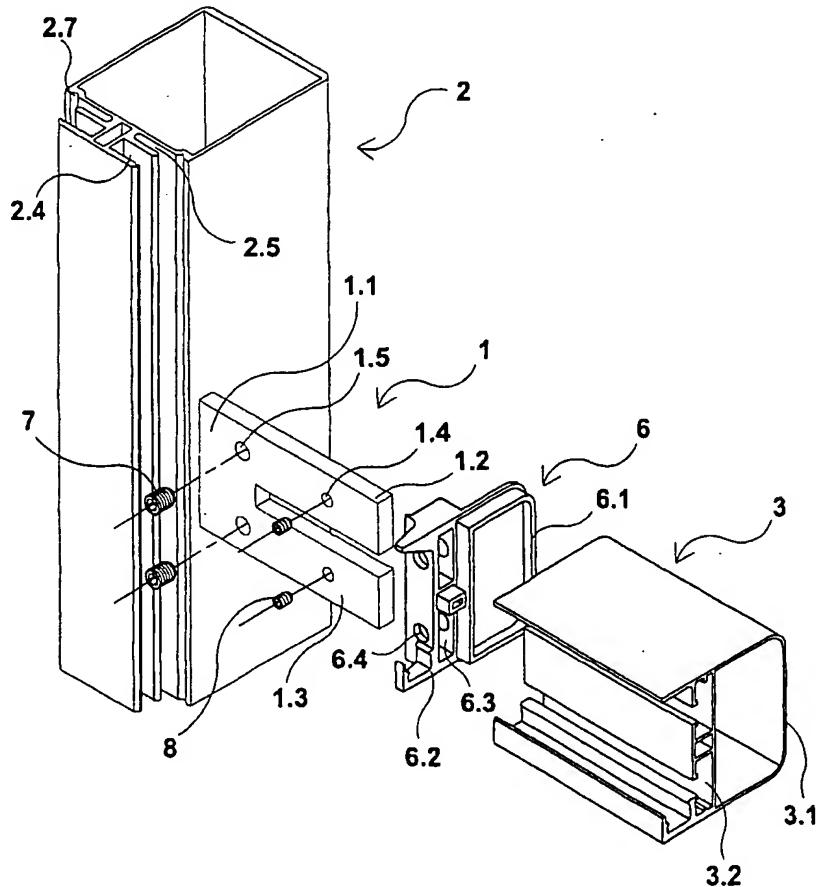
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[Continued on next page]

(54) Title: SYSTEM AND METHOD FOR JOINING MULLIONS TO TRANSOMS



(57) Abstract: A system for joining mullions to transoms comprising:- section bars, which are suitable to obtain transoms (3), having a body (3.1) and at least one channel (3.2) whose longer axis is the vertical axis, and whose longitudinal axis is parallel to that of transoms (3); - section bars, which are suitable to obtain mullions (2), having at least one seat (2.2), whose longitudinal axis is parallel to that of mullions (2); each seat (2.2) is an ideal extension of channels (3.2) of transom (3) and is divided into at least two channels (2.4, 2.5) by at least one fin (2.6), whose longitudinal axis is parallel to that of mullion (2); - inserts (1) formed by plates having at least two holes (1.4, 1.5), out of which at least one hole (1.5) is obtained at one end; the said holes (1.4, 1.5) contain screws or dowels (7, 8); each insert (1) is fitted into at least one channel (3.2) of transom (3) and one channel (2.4, 2.5) of mullion(2); - spacers (4, 5) to spare the transoms vertically.

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SYSTEM AND METHOD FOR JOINING MULLIONS TO TRANSOMS

System for joining mullions to transoms by less working.

Technical field

The present invention refers to a system which enables to join, without any additional work, section bars in façades (to mullions and transoms, both 5 semi-structural and structural), band frames, movable walls, and in general wherever mullions are to be joined to transoms with mitred joints.

State of the art

Many systems are available to join mullions to transoms by using metal or plastic section bars. The most advanced systems provide for non-sequential 10 joining between section bars by front insertion of transoms into mullions. This enables to prepare transoms before assembly, thus reducing the relevant costs. A further decrease in costs results from the fact that this method enables an easier assembly as compared to sequential joining systems.

Unfortunately, the non-sequential front joining systems known today, 15 although valid, have also quite high assembly and disassembly costs. In order to reduce these costs, many solutions have been designed, all of them trying to minimise the works to be performed on parts to be joined.

Within this framework, we passed from works on mullions (aimed at obtaining notches to insert transoms) to works on transoms. The latter, being 20 cut at the desired length, are milled or sheared in order to remove a portion of the outer wall at their ends. Thereafter, they are frontally inserted into side supports fastened to mullions by means of screws, and then locked to them by means of additional screws. Moreover, in order to facilitate the removal of condensation water through mullion gutters, transoms are milled again at the 25 ends so as to obtain a projection at each of them in order to convey water in the said gutters. Finally, in order to obtain the soundest joining between mullions and transoms, sometimes mullion fins are also milled at the areas where the said projections are to be locked.

It is clear that the costs to prepare mullions and transoms are very high, 30 given the number of works to be performed: double milling or shearing of

transoms, milling of mullions, double perforation of mullions (in order to obtain the holes to contain the screws of side supports and the screws to join transoms and mullions).

Moreover, labour is required for both the works on section bars and
5 preliminary fastening of side supports.

Some front fastening systems which can be used instead of those described above provide for the use of joining elements that enable to avoid works on section bars. According to these new methodologies, transoms are cut at the desired length. Their ends are closed with plastic plugs that act as gaskets
10 and dilatation compensators. Finally, transoms are joined to mullions by means of metal bars placed horizontally between transoms and mullions, and then fastened to them by means of screws. Metal bars are fitted into special transom channels or chambers. This creates a typical cross-shaped joint wherein the screws play an essential role for the purpose of tightness. In
15 addition to reduced resistance to torsional stress in transoms, it is however necessary to perforate or shear both mullions and transoms, and this makes the preparation of the various parts expensive, even though to a lesser extent.

Summary of the invention

20 The aim of the invention is to make available to users a joining system for section bars that does not provide for any supplementary work in addition to cutting mullions and transoms in order to build façades, band frames and movable walls.

A consequent aim is to enable front assembly and disassembly of section
25 bars at very low costs with the relevant economic advantages.

These and other aims are achieved through the system being the subject matter of the present invention, which is characterised by the use of section bars, an insert and vertical spacers.

The section bars that are suitable to obtain transoms have one or more channels, whose longitudinal axis is parallel to that of section bars, the
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longer axis being the vertical one.

The section bars that are suitable to obtain mullions have a seat, whose longitudinal axis is parallel to that of section bars, which is an ideal extension of transom channels. It can be divided into one or more channels by at least 5 one fin, whose longitudinal axis is parallel to that of section bar.

The insert is a bar. It is almost entirely fitted into at least one of the transom channels, whereas one of its ends protrudes from the channel. The insert has two or more threaded holes, out of which at least one is located at the 10 end protruding from transom channels. These holes contain screws or dowels. An insert portion can be divided into two or more fins parallel to transoms and joined between them at mullion.

The said screws or dowels are fitted into insert holes, and they prevent the insert from moving horizontally. In order to prevent heavy glasses or panels, or momentary loads, from provoking a downward mullion slip, special 15 spacers are used.

A tight plug can close each end of the transom. It is formed by a body having the same profile as the transom, and a support protruding from the body in the opposite direction to the transom end. The support has one or more slits having a clear span of the same size as the insert body, and horizontal 20 holes.

The use of the said insert to join transom and mullion avoids all works, except for cutting transoms. The latter are cut at the desired length in the workshop, and their ends are closed with plugs, if required, where inserts are placed. Therefore, the personnel in charge of the assembly of façades, band 25 frames, movable walls, etc., will be sufficient to fasten inserts to mullions and transoms. The assembly is hence easy and quick, thus drastically reducing the costs and time required for these operations.

Short description of drawings

Further characteristics and advantages of the present invention will be 30 clearer from the description of a preferred, but not unique, embodiment of the

invention showing – for information only, and without any limitation - the details of the system on the drawings enclosed herewith, where:

- figure 1 is a cross section of a mullion according to the invention;
- figure 2 is a cross section of a transom;
- 5 - figure 3 is an enlarged cross section of a first spacer;
- figure 4 is an enlarged longitudinal section of the insert;
- figure 5 is an enlarged cross section of the joining area of the mullion;
- figure 6 is a section of the mullion, transom, insert, plug and two spacers shown on the previous drawings, joined between them;
- 10 - figure 7 is another cross section of the transom with the insert within it;
- figure 8 is a perspective exploded view of the mullion, transom, insert and plug shown on the previous drawings.

Detailed description of a preferred embodiment

The joining system according to the present invention in a preferred embodiment, which can be used in particular for continuous façades, provides for the use of inserts 1, section bars suitable to create mullions 2, section bars suitable to create transoms 3, a first type of spacer 4, and a second type of spacer 5.

Each insert 1 is a substantially U-shaped plate, having a body 1.1 and two fins 1.2, 1.3 parallel to those of transoms 3. Four holes are obtained in insert 1 and more precisely two holes 1.4 in fins 1.2, 1.3 and two holes 1.5 in body 1.1.

The section bars suitable to create transoms 3 have a box-type body 3.1 and two channels 3.2, whose longitudinal axis is parallel to that of transoms 3, the longer axis being the vertical one. The two fins 1.2, 1.3 of insert 1 are fitted into the said channels 3.2, whereas body 1.1 protrudes from channels 3.2.

The section bars suitable to create mullions 2 have a box-type body 2.1 and a double seat 2.2, whose longitudinal axis is parallel to that of section bars, and is limited by arms 2.3. Each seat 2.2 is divided into two channels 2.4, 2.5

by a fin 2.6, whose longitudinal axis is parallel to that of mullion 2. On the wall of box-type body 2.1 faces fin 2.6, there is a longitudinal groove 2.7. On arms 2.3, a longitudinal groove 2.8 is also obtained.

5 A third section bar acts as a spacer 4. It has a body 4.1 from which two arms 4.2, 4.3 protrude. An arm 4.2 is equipped with a catch 4.4 placed on the outer face of arm 4.2.

A tight plug 6 closes the end of each transom 3. Each plug 6 is formed by a body 6.1 having the same profile as the tubular portion of transom 3 and a support 6.2 protruding from body 6.1. Support 6.2 is longitudinally crossed by 10 two vertical slits 6.3 having a clear span of the same size as the two fins 1.2, 1.3 of insert 1 and two horizontal cross holes 6.4.

At the time of assembly, transom 3, which is already equipped with plugs 6 and inserts 1, is frontally coupled to mullion 2. Fins 1.2, 1.3 of insert 1 are fitted into slits 6.3 of plug 6 and chambers 3.2 of transom 3. On the contrary, 15 body 1.1 of each insert 1 is entirely fitted into channel 2.4 of mullion 2.

In order to prevent insert 1 from detaching from mullion 2, some dowels 7 are used. They cross holes 6.4 of plug 6 and threaded holes 1.5 of body 1.1, thus engraving the walls of groove 2.7 of mullion 2, and creating horizontal seats that prevent further movements between mullion 2 and transom 3. 20 Dowels 7 also play another role. Their tips use groove 2.7 as a fulcrum to lever on plug 6, thus obliging it to press against mullion 2, preventing the passage of water, and therefore ensuring a tight system.

The insertion of body 1.1 of insert 1 into channel 2.4 prevents the accidental detachment of insert 1 from mullion 2. The contact between the walls of 25 insert 1 and the walls of channel 2.4 prevents insert 1 - and therefore transom 3 - from rotating along its longitudinal axis.

Two additional dowels 8 prevent insert 1 from moving in channels 3.2 of transom 3. The said dowels 8 are fitted into threaded holes 1.4 of fins 1.2, 1.3 of insert 1 and engrave a wall of body 3.1 of transom 3.

30 In order to prevent insert 1 from moving whenever transom 3 supports heavy

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or momentary loads, a spacer 4 is used. It is entirely fitted into the same channel 2.4 of mullion where insert 1 is fitted. Catch 4.4 on arm 4.2 fits into groove 2.8 on arm 2.3 of mullion 2, and prevent it from detaching.

Spacer 4 is placed between one insert 1 and the insert above it. It creates a
5 vertical distance between one transom 3 and the other, and supports them. Therefore, the time required to assembly the system is reduced, since scribing on mullions 2 is no longer necessary.

Assembly is sequential and upward oriented. After locking mullions 2 at the desired location, a first transom 3 is fastened to two contiguous mullions 2;
10 thereafter, spacers 4 are fitted into two millions 2 above the first two inserts 1, then a second transom 3 is fastened, and so on so forth until the façade is completed.

Alternatively, also a second spacer 5 can be used, whose double function is to create a distance between transoms 3 and to support the fastening
15 elements of wings, if required. It is provided with two arms 5.1, 5.2. The first arm 5.1 fits into channel 2.5 of mullion 2 which does not contain any insert 1 or spacer 4. Spacer 5 is fastened to mullion 2 by means of a gasket 9, which is provided with a relief 9.1 intended to occupy groove 2.7 on the wall of body
2.1

CLAIMS

- 1 - System for joining mullions to transoms by less working, characterised in that it uses:
- section bars which are suitable to obtain transoms (3), having a body (3.1) and at least one channel (3.2), whose longer axis is the vertical axis, and whose longitudinal axis is parallel to that of transoms (3);
 - 5 - section bars which are suitable to obtain mullions (2), having at least one seat (2.2), whose longitudinal axis is parallel to that of mullions (2), and is limited by arms (2.3); each seat (2.2) is an ideal extension of channels (3.2) of transom (3), and it is divided into at least two channels (2.4, 2.5) by at least one fin (2.6), whose longitudinal axis is parallel to that of mullion (2); at least one seat (2.7), whose longitudinal axis is parallel to that of mullion (2), is obtained in the wall of mullion (2) from which arms (2.3) protrude and limit the said seat (2.2); on the said arms (2.3) a groove is also obtained (2.8), 10 whose longitudinal axis is parallel to that of mullion (2);
 - 15 - inserts (1) formed by plates having at least two holes (1.4, 1.5), threaded or not, out of which at least one hole (1.5) is obtained at one end of inserts (1); the said holes (1.4, 1.5) contain screws or dowels (7, 8); each insert (1), having a complementary geometry to that of one channel (2.4, 2.5) of mullion (2), is fitted into at least one of the channels (3.2), whose longer axis is vertical to transom (3), and one of its ends protrudes from channel (3.2);
 - 20 - spacers (4, 5) formed by metal section bars inserted into channel (2.4) that is intended to be joined to insert (2), or into a second channel (2.5) obtained in seat (2.3) between one mullion (2) and the mullion above it; the said spacers (4, 5) are fastened to mullion (2) by means of a joint, gaskets (9), or another simple joining system.
 - 25 2 - System according to claim 1, characterised in that insert (1) comprises a body (1.1) and two or more fins (1.2, 1.3) parallel to that of transoms (3); the said fins (1.2, 1.3) are fitted into channels (3.2), whose longer axis is vertical to transom (3), whereas body (1.1) protrudes from channels (3.2).

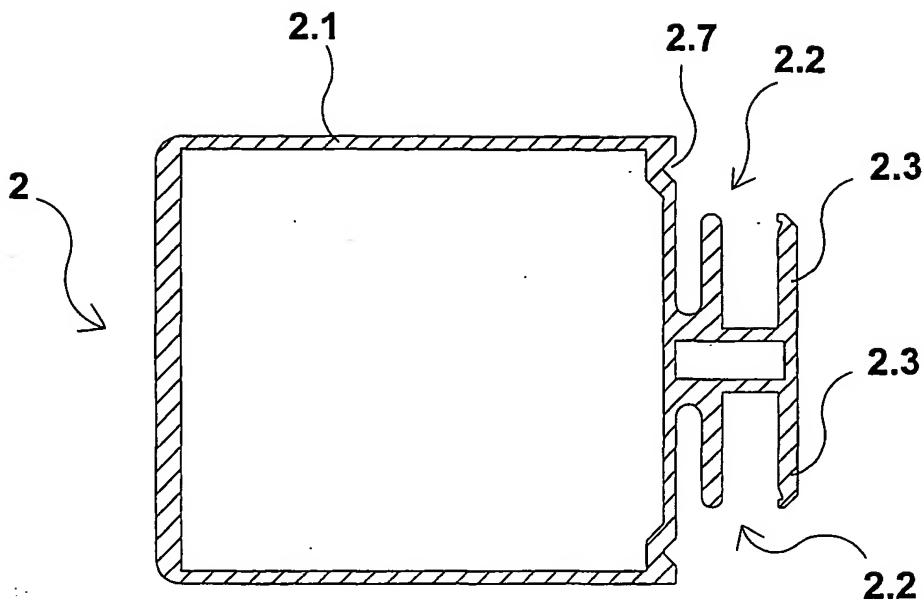
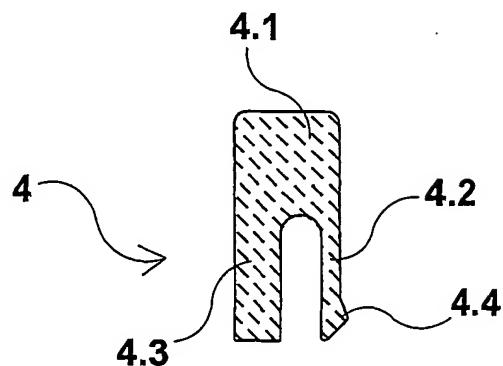
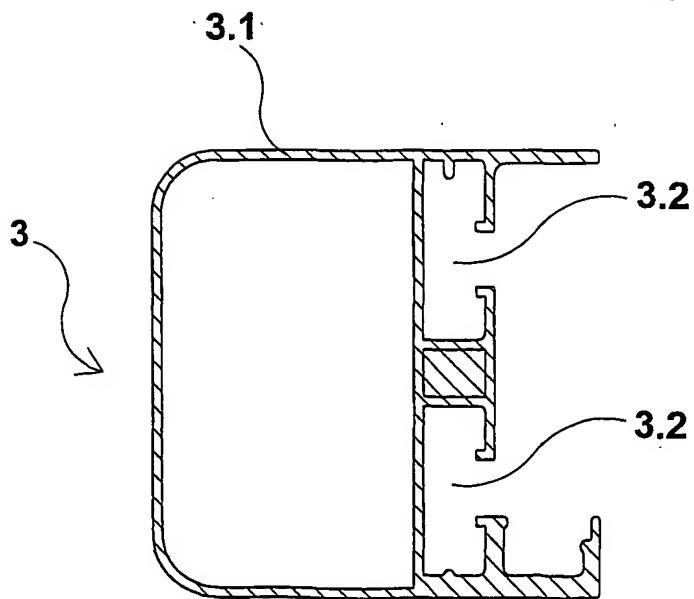
- 3 - System according to claims 1 and 2, characterised in that a tight plug (6) closes the end of each transom (3); the said plug (6) is formed by a body (6.1) having the same profile as transom (3) and a support (6.2) protruding from body (6.1); the said support (6.2) is crossed by at least one slit (6.3) having a clear span of the same size as the section of insert (1) and horizontal holes (6.4).
- 5 4 - System according to claim 1, characterised in that each seat (2.2) of mullions (2) has one channel (2.4, 2.5) only.
- 5 5 - System according to claim 1, characterised in that each spacer (4) is fastened to mullion (2) by means of a catch (4.4) fitting into a groove (2.8) of mullion (2).
- 10 6 - System according to claim 1, characterised in that each spacer (5) is fastened to mullion (2) by means of a relief (9.1) on gasket (9) fitting into groove (2.7) on the wall of body (2.1).
- 15 7 - System according to claim 1, characterised in that it comprises the following steps:
- fastening of section bars suitable to create mullions (2) at the desired location;
 - insertion of an insert (1) into each end of transom (3), being equipped with plugs (6) or not;
 - front coupling of transom (3) to two contiguous mullions (2);
 - sliding of each insert (1) until when its end free from channels (3.2) almost entirely fits into one channel (2.4, 2.5) of mullion (2);
 - fastening of a first transom (3) to two contiguous mullions (2) by means of screws or dowels (7) passing through threaded holes (1.5) obtained at the free end of inserts (1) and holes (6.4) of plugs (6), and engraving the walls of mullions (2), thus creating horizontal seats;
 - fastening of each insert (1) to transom (3) by means of screws or dowels (8) passing through additional holes (1.4) obtained in insert (1);
 - 20 30 - joining of special spacers (4, 5) in two mullions (2) above the first two

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inserts (1);

- fastening of additional transoms (3) as described above following an upward sequence until completion of the façade, band frame or movable wall.

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**FIG. 1****FIG. 3****FIG. 2**

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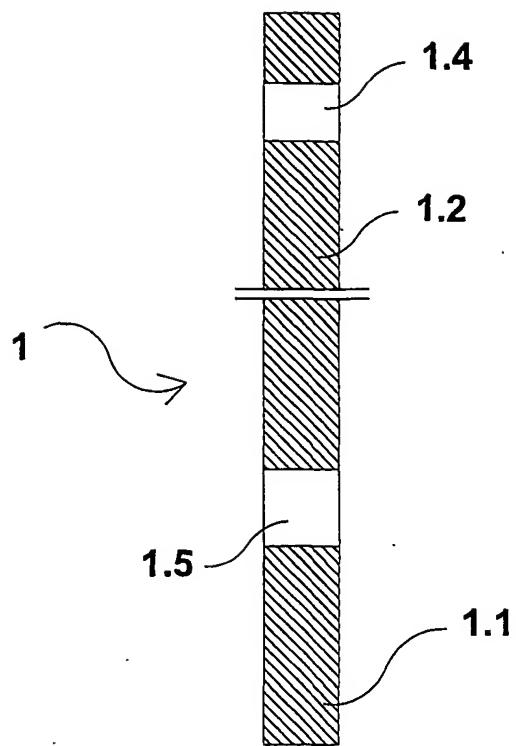


FIG. 4

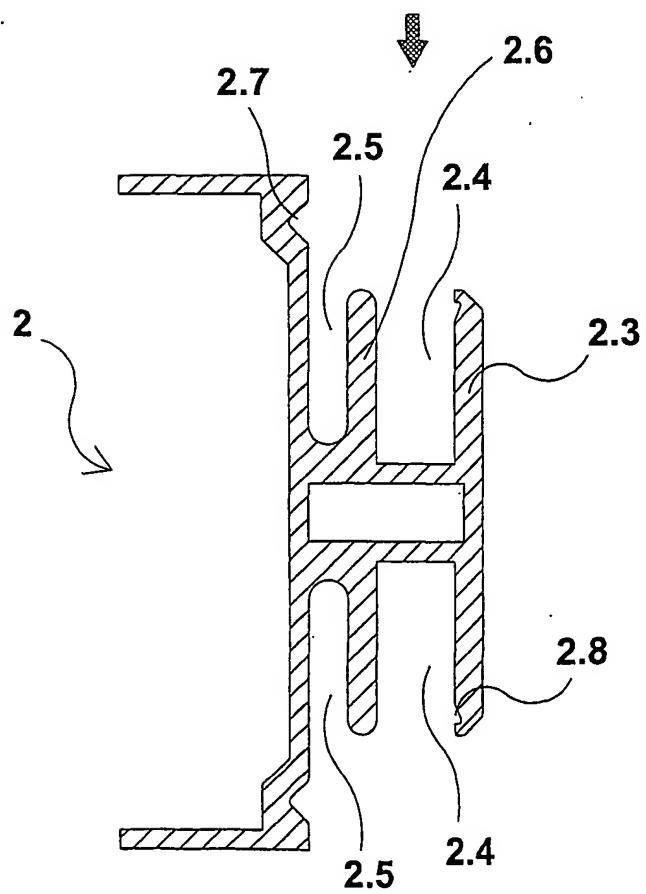


FIG. 5

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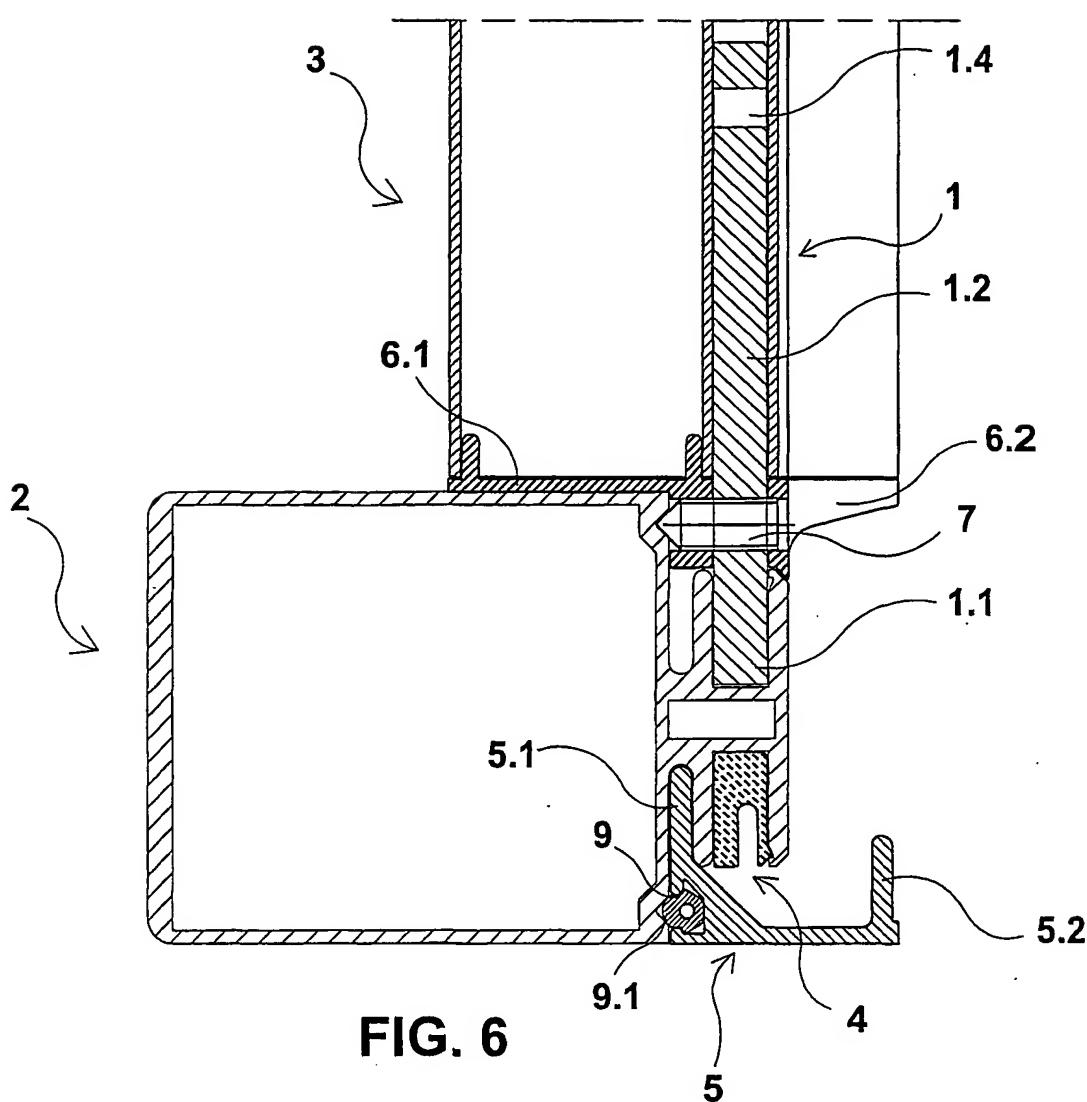


FIG. 6

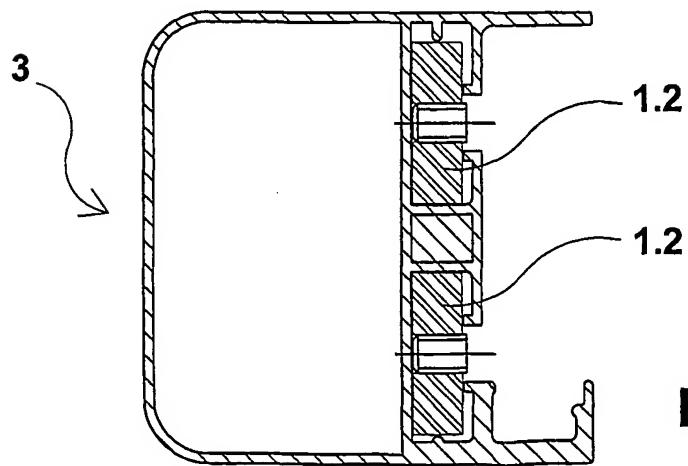


FIG. 7

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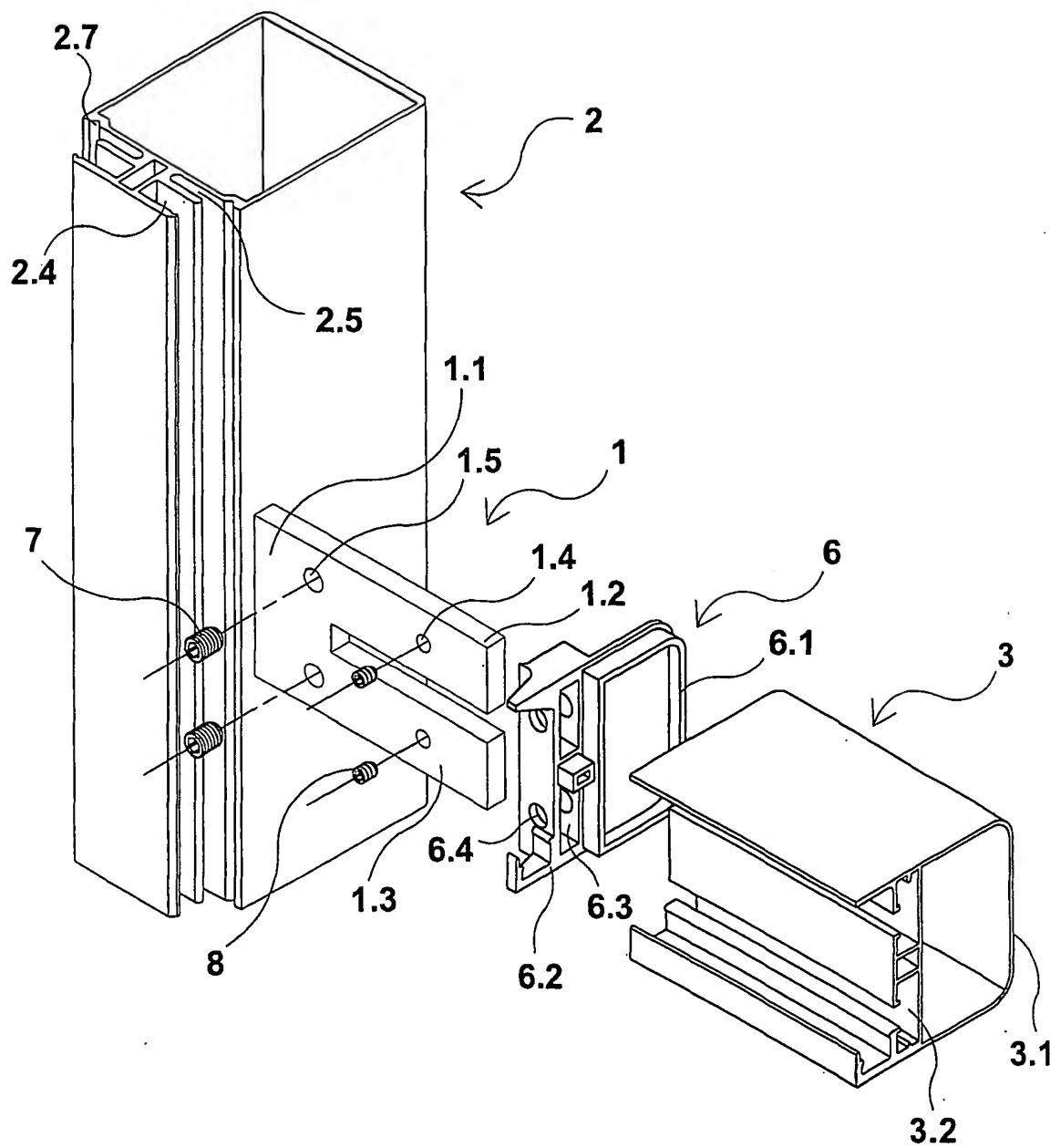


FIG. 8

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 E04B2/96

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 7 E04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Patent family members are listed in annex.

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Date of the actual completion of the International search

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document and indication, where appropriate, of the relevant passages	Relevant to claim No.
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